reform
week III

Technical data package conversion for Modernization through spares

Facilitator Guide

Acquisition Reform Week III
Technical Data Package Conversion for Modernization through Spares

Scope of Seminar

Modernization through Spares (MTS) is an approach to take advantage of funds used for reprocurement of spares to improve the associated end item. This seminar introduces a performance based business approach to managing Technical Data Packages (TDP) in support of MTS initiatives. A methodology for selecting TDP candidates for conversion to MTS is presented. Use of market research data and trigger- based item management are included topics. *

Instructions to Facilitators

Each Acquisition Reform Week III seminar takes approximately one and one-half hours to complete. To maximize the potential for participants to gain an overall understanding of the subject, we suggest you hand out presentation materials 2-to-24 hours in advance. If participants read the information before the seminar, the facilitator can conduct a brief recap and then devote a significant portion of the time to practical experience such as exercises, e.g. working through the scenario which demonstrates the principles outlined in the presentation.

As Facilitator you will need a copy of the full package which is detailed below. Participants should receive item #2 in advance, if possible: item #3 should be handed out in the seminar. Items #1 and #4 for the exclusive use of the Facilitator.

Included in this file are the following:

TIP: Print pages in the order noted so you will have one complete package. Then, duplicate individual sections as needed depending on number of participants. This will ensure materials are in correct order and will reduce the risk of the file being too large for computer or printer equipment to handle with ease.

Main Teaching Points

These are the three main teaching points in this seminar. Before proceeding to the practice session, make sure participants understand the following:

1. The methodology for selecting and prioritizing potential MTS candidates at the base of the MTS strategy.

2. The importance of applying trigger-based item management and other conversion tools for the successful implementation of MTS.

3. The basic screening criteria at the core of the trigger-based item management approach.

* This seminar was tailored from materials used in the 2-day Technical Data Package Conversion for Modernization Through Spares Workshop, developed and presented by the BRTRC Institute for HQ Army Materiel Command. For more information please contact (703) 205-1593, or visit our website at: http://institute.brtrc.com.

Overview and Presentation for Participants

Acquisition Reform Week III
Technical Data Package Conversion for Modernization through Spares

Overview
Welcome to the Acquisition Reform Week III seminar, Technical Data Package Conversion for Modernization through Spares. This session is designed to help participants understand the following:

1. The methodology for selecting and prioritizing potential MTS candidates as the base of the MTS strategy.
2. The importance of applying trigger-based item management and other conversion tools for the successful implementation of MTS.
3. The basic screening criteria at the core of the trigger-based item management approach.

Exercise Objective
The exercises included in the seminar are intended to enable participants to gain a full understanding of the basic aspects of developing an MTS strategy. The in-class exercise will enable participants to utilize the trigger-based item management approach as a prelude to developing an MTS strategy.

Instructions to Participants
Please review the presentation. Be prepared to ask questions and/or participate in a brief recap. This will be followed by an exercise session which will test your understanding of the principles captured in the presentation material and give you hands-on experience when managing Technical Data Package Conversion for Modernization through Spares .

WHAT IS Modernization
Through Spares?

DEFINITION:

MTS is a spares/component improvement strategy applied throughout the Acquisition Life Cycle based on technology insertion to enhance systems and extend useful life while reducing costs.
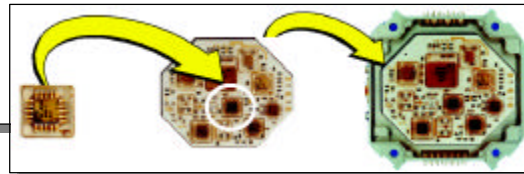
3/7/98   TDP Conversion for MTS   1

This is one definition of modernization through spares. MTS is a DoD wide initiative to take advantage of the funds and resources devoted to reprocurement of spares, secondary items and end items to improve reliability, upgrade performance, and reduce costs. A central principle is to modify existing practices in order to make better use of technology evolution in the commercial sector.

Modernization through Spares techniques apply to the entire acquisition life cycle and new developments should plan from the beginning to use them. An Open Systems Approach along with a host of other techniques apply, but they are subjects beyond what we can deal with in this seminar.

This seminar will specifically address applying modernization through spares to legacy systems.

The only source of Modernization Funds

"We'll pay for our Revolution in Military Affairs with a Revolution in Business Affairs"
Honorable William S. Cohen

"... far too much of the total budget goes to support, there must be a significant shift of resources from support to modernization..."
Honorable Dr Gansler

We must leverage O&M to modernize

A Total Ownership Cost Perspective:

Funds Budgeted for Capability

Legacy System Costs

Replacement System Costs

Time
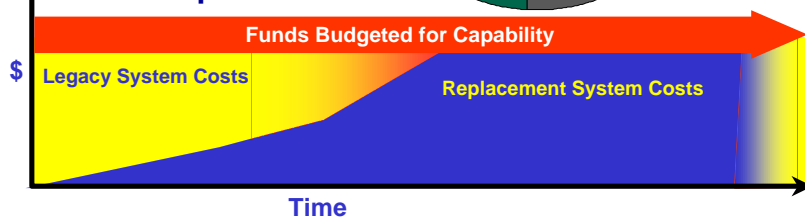
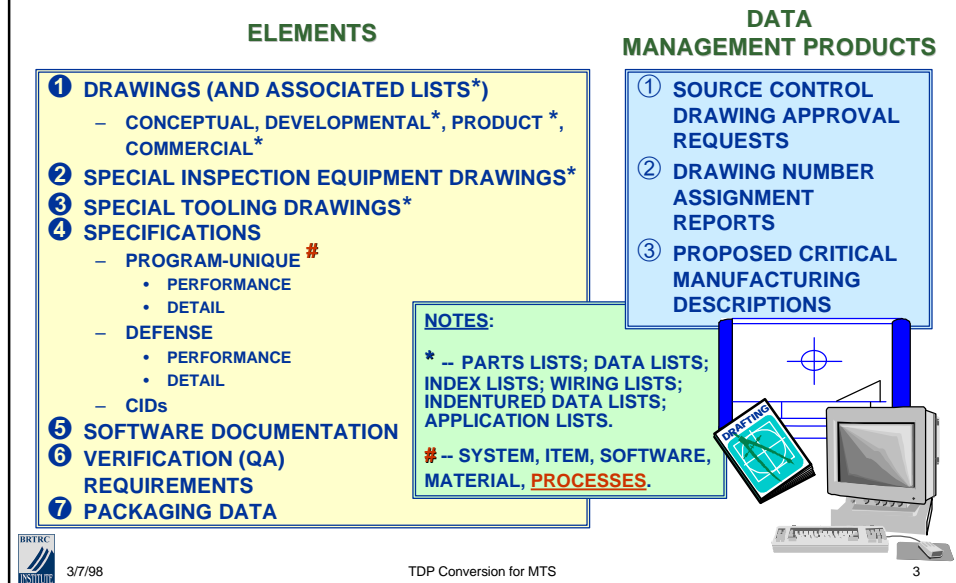3/7/98 — TDP Conversion for MTS — 2

Modernization Through Spares is only one element of reengineering the DoD logistics support system. In many cases the only available funds for upgrades to existing systems are those allocated to system support.

The relative share of budgets allocated to support varies from to DoD agency to agency, but in general more than half of DoD funds are expended in this area. Procurement budgets make up a much smaller share and have trended sharply down over the past several years.

MTS techniques are based on leveraging support funds not only to improve existing systems but also to reduce legacy system support costs to free funds for modernized replacements. The MTS approach is an integral part of a total ownership cost perspective.

Technical Data Packages

ELEMENTS

❶ DRAWINGS (AND ASSOCIATED LISTS*)
   – CONCEPTUAL, DEVELOPMENTAL*, PRODUCT *, COMMERCIAL*
❷ SPECIAL INSPECTION EQUIPMENT DRAWINGS*
❸ SPECIAL TOOLING DRAWINGS*
❹ SPECIFICATIONS
   – PROGRAM-UNIQUE #
     • PERFORMANCE
     • DETAIL
   – DEFENSE
     • PERFORMANCE
     • DETAIL
   – CIDs
❺ SOFTWARE DOCUMENTATION
❻ VERIFICATION (QA) REQUIREMENTS
❼ PACKAGING DATA

DATA MANAGEMENT PRODUCTS

① SOURCE CONTROL DRAWING APPROVAL REQUESTS
② DRAWING NUMBER ASSIGNMENT REPORTS
③ PROPOSED CRITICAL MANUFACTURING DESCRIPTIONS

NOTES:

* -- PARTS LISTS; DATA LISTS; INDEX LISTS; WIRING LISTS; INDENTURED DATA LISTS; APPLICATION LISTS.

-- SYSTEM, ITEM, SOFTWARE, MATERIAL, PROCESSES.

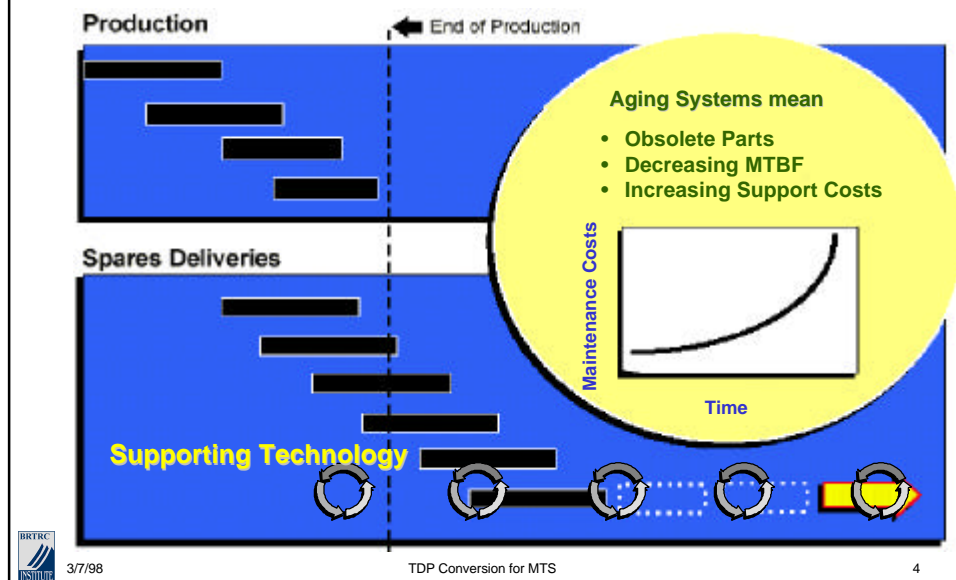3/7/98   TDP Conversion for MTS   3

Hundreds of thousands of reprocurement actions are routinely based on technical data packages. Contents of technical data packages may vary but most will have some or all of the items shown on this chart.

Most technical data packages contain detailed design requirements which specify how an item procured with the TDP is to be manufactured or produced. Other specific Government standards may be specified as well. This "build to print" approach is frequently used to insure replacements are standard and can be stocked for multiusers.

The most common practice is to collect all of this data from the producer of the end item at the time the end item is provided. Keeping technical data packages up to date is a monumental task. A reduced logistics support structure has made this task all that more difficult.

Challenges in Sustainment

Production — End of Production

Aging Systems mean
- Obsolete Parts
- Decreasing MTBF
- Increasing Support Costs

Maintenance Costs / Time

Spares Deliveries

Supporting Technology

3/7/98 — TDP Conversion for MTS — 4

The central issue of routinely using technical data packages for reprocurement is creeping obsolescence of the technology they reflect as time passes.

Technical data packages describe the item as it was produced and are a snap shot in time. As the item ages supporting technology continues to evolve, manufacturers change their processes and the technical data package falls farther and farther out of date.

Aging TDPs mean obsolete replacement parts and reduced performance and increased costs.

**Modernization Through Spares Alternatives**

No action required ...	**Status Quo** - Business as usual, typically Detail Design TDP
Further action required ...	**Bridge Buy** - Satisfy immediate needs, but address long-term solution
Commercial-oriented ...	**Consolidate** at a higher subassembly
	Buy **Commercial**
	Use a **Commercial Item Description**
Performance-oriented ...	Change to **Contractor Logistics Support**
Specific Tailoring ...	Build a **Performance SPEC**
	Use a **Purchase Description**
	Write requirements directly into **RFP Section C**

3/7/98 — TDP Conversion for MTS — 5

Modernization through spares alternatives range from business as usual to converting TDPs into performance specifications or even to reengineering subassemblies to gain improved performance. Some of the key alternatives are described on this slide. Many are designed to take advantage of the commercial sector with best value procurements when that is justified. That could include the radical approach of turning problem items over to contractor logistics support if that has advantages.

The common characteristics of all these alternatives except for business as usual is that they take time and resources to implement. Just the crush of meeting day to day requirements creates considerable inertia against making the changes necessary to implement modernization through spares
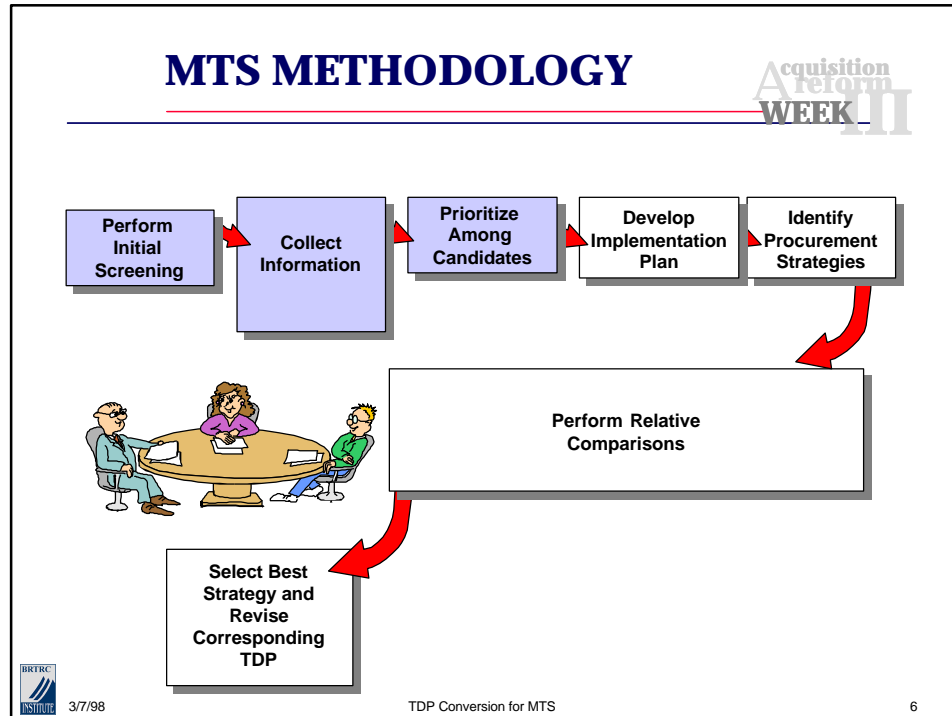
This seminar addresses "How to Get Started". A complete MTS methodology is sketched out on this chart. We will discuss the first three critical steps necessary to begin the process. Our objective is to look at steps to screen the huge body of data and select those TDPs that are priority candidates for a modernization through spares approach.

We'll do a quick initial screening to find the candidates which meet trigger based indicators. Next we'll conduct some limited information search including market research on these to provide data for prioritizing among the candidates we selected. We will stop with that step.

At that point the next step would be to develop a general approach or plan to implement an MTS approach and identify potential procurement strategies.

The final steps would be to examine the possible strategies to select the best, and modify the TDP to implement that strategy.
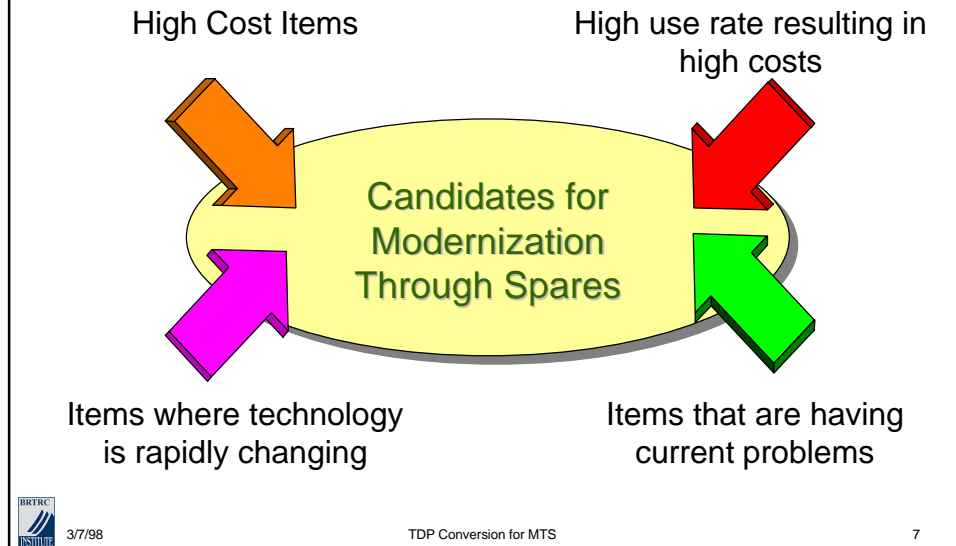
The central theme of screening for MTS candidates is to identify the critical factors that indicate which TDPs have justifying addressing with a modernization through spares approach. These factors form the basis for trigger items to look into more closely.

In deciding which TDPs could benefit most from conversion, there are some basic business considerations that may help you make the decision. For example, items that are very expensive or where new technology is coming on line are definite candidates. Items that have a high use rate, wear out or break down quickly might also benefit from an updated TDP.

Three Step MTS Screening Process

How do we pick candidates that will have the biggest payoff?

Available Information

1-Initial Screen

2-Collect Additional Information

3-Priority Screen

Three steps -- to minimize the amount of research

1- Initial trigger item screen to identify candidates

2- Collect additional information on candidates

3- Second screen to prioritize candidates

Priority candidates for MTS
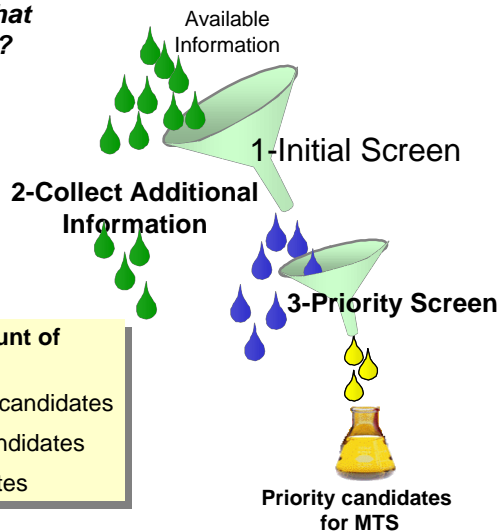
3/7/98   TDP Conversion for MTS   8

Here, pictorially, is what we're trying to accomplish in our screening to select candidates that provide the highest payoffs first and then set priorities on which of those to deal with.

We will use a concept called trigger-based item management to help accomplish the initial screening. Then we will collect additional information on the candidates to help set priorities. Again the screening approach is to get the MTS process started.

Initial Screening Trigger Items

- **LOGISTICS Factors**
  - Supportability of the component and system
- **TECHNICAL Factors**
  - Technical performance and configuration management
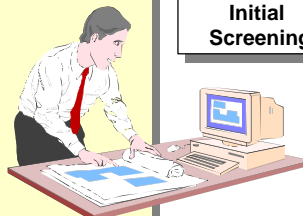- **BUSINESS Factors**
  - Contracting and business base issues
- **MANAGEMENT Factors**
  - Changes in Laws and Regulations (ODC's, hazardous or prohibited Processes)
- **OTHER Factors**
  - Is there a reason to look deeper at this item or subsystem?

Perform Initial Screening

3/7/98   TDP Conversion for MTS   9

There are many triggers to consider for the initial screening. Triggers are simply indicators that we may have a problem. The trigger items may vary from commodity to commodity and agency to agency but can be grouped loosely into the general categories you see here. We'll talk about each in the slides that follow.

One key point should be apparent as you look at this slide: it takes a team to work MTS. Information to identify and use the various triggers are spread throughout all the functions and disciplines involved in materiel acquisition and support.
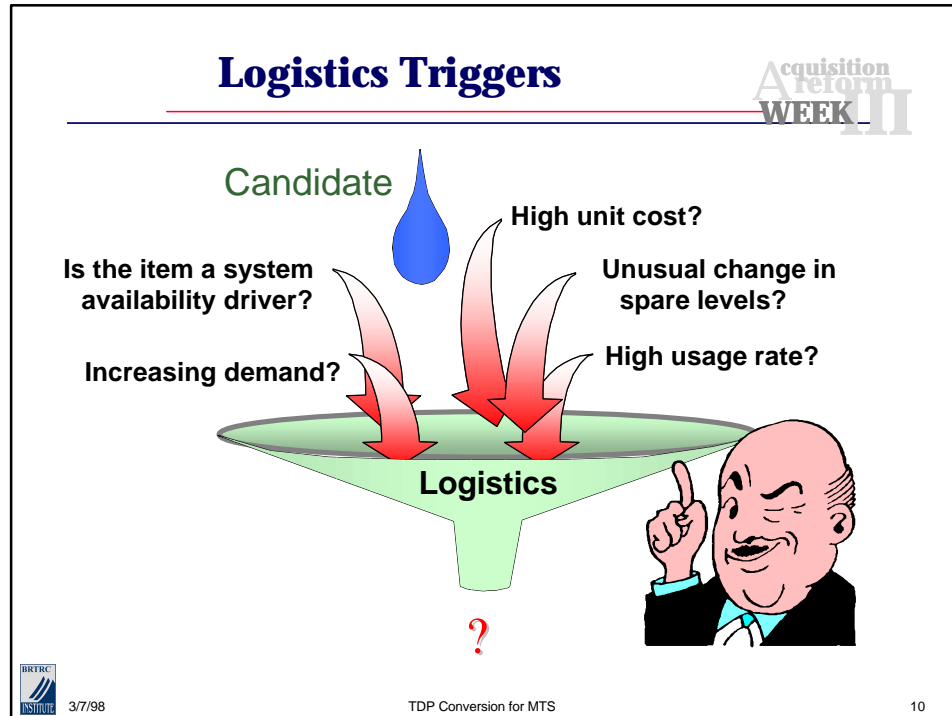
Here are the high priority logistics triggers, the list is not intended to complete. Others may apply to a particular situation.

If the item is a system availability driver--causes the system to be not mission ready--it is clearly a high priority for MTS.

Increasing demand for the part may indicate that its service life is being reached. High usage rates may result in high annual costs. Early identification of these items would provide the greatest opportunity to reduce those costs.

Expensive, high-cost parts are clearly candidates for MTS, as are low-priced items that we use many of. The end result is the same--precious resources expended--and it indicates there may be an opportunity for improvement.

Finally, unusual changes in spares inventory levels usually indicate that closer examination is needed. Some underlying problem is usually the cause, which may not be apparent until it is almost too late.

Technical Triggers

Candidate

High annual rates for changes, deviations or waivers?

Significant downward reliability trend?

Engineering efforts routinely required for problems?

Engineering Change Proposal (ECP) timeline exceeds technology turnover rate?

Many changes, deviations or waivers pending?

Technical

?

3/7/98   TDP Conversion for MTS   11
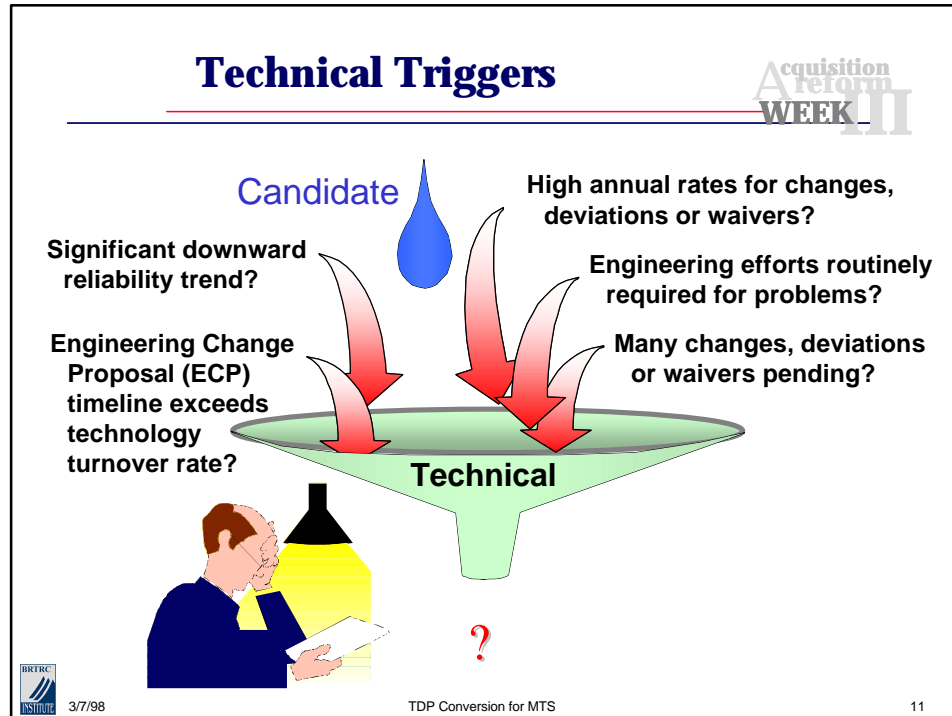
The high priority technical triggers.

Is the part getting significantly less reliable as time passes?

Does it take longer to get an ECP approved than the technology takes to advance? In some industries (like electronics) this is the case, and it is a clear indicator that a performance based approach is required.

Are we getting many changes, waivers, and deviations…or is engineering support routinely needed for every procurement? These may all be indicators that we're specifying poor or obsolete technology.

Business Triggers

Candidate

Service's standardization requirements changed, i.e. Horizontal Technology Insertion (HTI), and parts standardization?

Out-of-production parts?

Parts no longer available or vendor's product is designed differently?

Difficult procurements?

Business

?

3/7/98   TDP Conversion for MTS   12
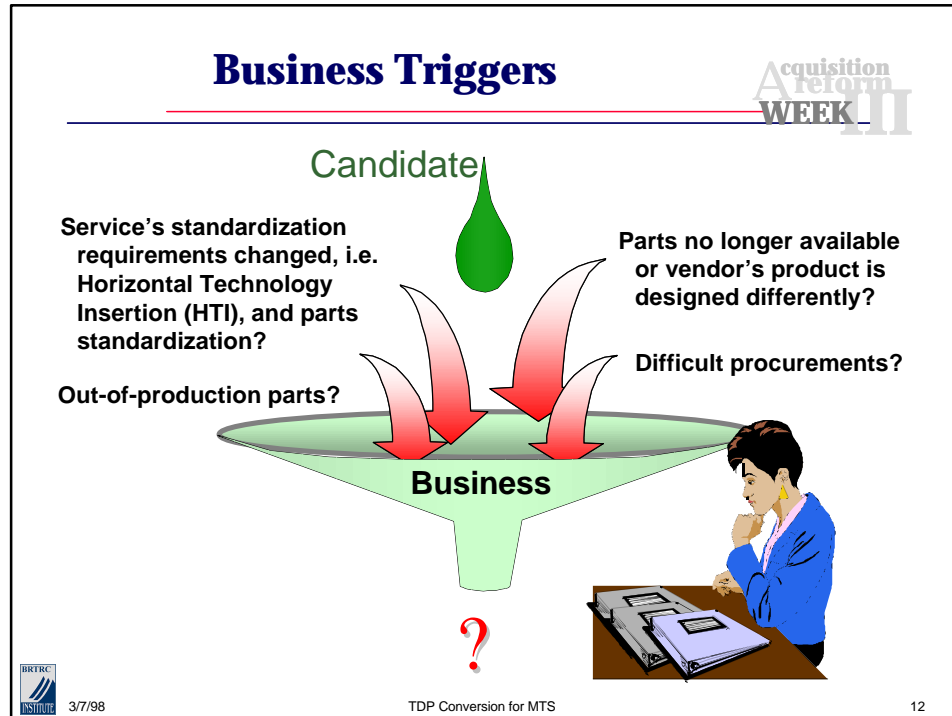
Here are some high priority business triggers. Others may apply to a particular situation.

Does the existing TDP call for out-of-production parts? Is there a single supplier instead of multiple suppliers for the part? Are improved parts available?

Are there Contractor Logistics Support opportunities to take advantage of to lower cost and improve performance? Is newer technology available, newer materials, newer and better manufacturing processes that will extend the life of the item?

It is important to remember that we can have the best, most accurate TDP in the world, but if nobody will build the item we want, we have a severe problem.

Of course, somebody will usually respond to a solicitation. The problem is that it is usually an expensive proposition and in some cases may not be the kind of producer we really want to deal with.

Management triggers might include changes in laws and regulations. For example, a process or product may cause environmental damage and be declared hazardous. An alternative technology/process may have to be developed and/or identified.

The requirement for the item may have also changed to the point the current TDP does not provide the required level of performance.

MTS Initial Screening Checklist

✓	MTS Criteria		Importance		
	Area	*Factors*	**Low**	**Med**	**High**
	First Screen				
	LOGISTICS				
	Item is a system availability driver	Increasing MTTR, upward NORS trends			
	High usage rate	Resulting in high annual costs			
	Increasing demand	Increasing parts demand over time			
	High unit cost				
	Unusual change in spare levels	Fluctuations indicate possible problems developing			
	TECHNICAL				
	Significant downward reliability trend				
	Engineering efforts routinely required for problems	Technical support necessary for continual use			
	Engineering Change Proposal (ECP) timeline exceeds technology turnover rate	Time to process changes gives obsolete solutions			
	Many changes, deviations or waivers pending				
	High annual rates for changes, deviations or waivers				
	BUSINESS				
	Out-of-production parts	Production restart required			
	Difficult procurements	Unit cost trends increasing, or source selection problems			
	Parts no longer available or vendor's product is designed differently	Design obsolescence or vendor base problems			
	Service's standardization requirements changed, i.e. Horizontal Technology Insertion (HTI), and parts standardization	Policy mandates required changes			
	MANAGEMENT				
	User changed the requirements				
	Changes in laws and regulations (ODC's, Hazardous/Prohibited Processes)				

We have listed the various triggers on an initial screening checklist. Remember, we are trying to screen thousands of TDPs for those that appear to be good candidates for MTS. This checklist has degrees of ranking from low to high importance to provide flexibility for the initial screening. The form can be tailored for use in specific situations.

For this purpose, if any part meets a single high-priority trigger it becomes a MTS candidate. The more triggers, the higher the priority candidate it may become later.

Remember, the information needed for this trigger list is in many different places--with item managers, engineers, contracting specialists. We must talk between the communities to be effective.

An Example Situation
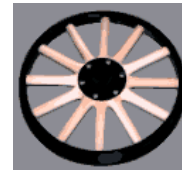
THE 67 YEAR-OLD ANTIQUE TRUCK

THE TRUCK'S WHEEL

Rebuilt and remanufactured Wheel

MIL SPEC 00003Z:
Spoke, Wheel, Wood,
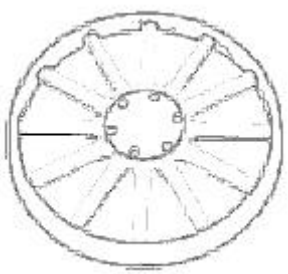Type Hickory,
Class Artillery

3/7/98   TDP Conversion for MTS   15

Lets work through the initial screening checklist together. Our example is an antique truck. We are in the role of the antique club chairman. The members of the club drive and display their trucks to raise funds. There is a collective problem. Many of the trucks cannot pass safety inspections necessary to drive on public roads because of problems with broken spokes on the wheels. We have good, accurate, detailed TDP for these spokes, but no one wants to rebuild new spokes more than once. It is difficult and tricky. Let's take a look at it. Using this TDP, can we get someone to build us new spokes?

Market research found there is in fact one company (in Canada) that still does this work. Send them broken wheels, and they rebuild. They do a great job, rebuild to like-new, at cost over $250 per wheel.

Of course, then we have a brand-new, 67 year old wheel that after very little use has the same problems. New wheels are great for display but not for use.

Technical Data Package
Spoke, Wheel, Wood,
Type Hickory, Class Artillery

Level 1 Maintenance:
Wheel Safety Check

Inspect wood for "dry rot" and cracked spokes.

Check tightness of spokes at hub joints and at the felloe end. (Any looseness or visible spaces indicate a potentially dangerous wheel)

Check soundness of the wheel using a piece of hardwood comparable in diameter to the spokes.

Strike the spokes of the test wheel. If the sound produced is a "Clean Sharp Click" then wheel is sound.

If striking the spokes produces a dull dead sound, then the wheel is loose and is unsafe. Repair as required.

Level 2 Maintenance: Prohibited procedures

(ECP# 0002) Methods which use shims to tighten joints and spokes or anti-freeze to swell the wood are neither safe nor permanent repairs. The only satisfactory and safe repair is a total rebuild with new spokes.

Materials and Processes:

Construct wheels with air dried wood during the winter season (November to March) when humidity levels are range 1-5%. Southern Saskatchewan, Canada is recommended as a suitable site for manufacturing.

Spokes are approximately 9-10" in length and approximately 1.25" in diameter. Match exact size and tolerances to fit during rebuild.

Construct spokes and felloes from shagbark hickory. Its properties of light color, extreme toughness, resilience, hardness, shock resistance and moderate weight make it the most suitable material.

Maintain tolerances to assure tight fit between spokes and rim/hub. The only safe wheel is one which is tight. Carefully construct spokes to produce accurate and precise fitting joints ensuring a solid wheel without using glue to secure spokes.

Machine and size hubs and hub holes to create a tight fit, producing the most solid wheel possible. Check the hub body for perfect roundness with a metal lathe. Where keyways in hubs are badly worn (a classic failure mode on rear hubs) cut a new keyway into the hub 180 degrees from the original.

Construct new spokes by machine but, hand assemble for final finishing to ensure spoke joints are matched to produce the most aesthetically pleasing wheel.

Preparation for rebuild:

Sandblast and prime wheels and hubs

Supply at least three of original spokes and a portion of wood (where applicable) with the rims and hubs.

Market Research - Wheel Rebuilding Capabilities
Single Source Available

Price:
Wood Felloe, 23" diameter - $200.00 per wheel
Wheels with oval or tear drop spokes - $10.00 per wheel extra.

Optional Services:
Sandblasting and Prime: Additional $25.00/Wheel.
Finishing: Paint or Varnish Additional $25.00/Wheel.
Replacement Hubs: (If Available) $10.00 to $20.00 Each.
New Wheel Bolts: (If Required) $2.00 Each.

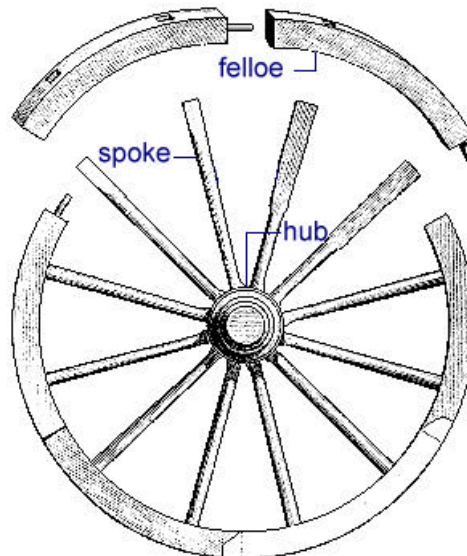Notes: Complete wheels are supplied without paint or varnish finishing. (i.e. raw wood)
    Pricing may change according to current wood prices.
    50 percent deposit required with order
    Freight charges not included

Schedule:
A set of 4 wheels generally requires about a week to rebuild. New hub boots are standard in final assembly (at extra cost).

MTS Initial Screening Checklist
Antique Truck

✓	MTS Criteria		Importance		
	Area	Factors	Low	Med	High
	First Screen				
	LOGISTICS				
	Item is a system availability driver	Increasing MTTR, upward NORS trends			X
	High usage rate	Resulting in high annual costs			X
	Increasing demand	Increasing parts demand over time		X	
	High unit cost				
	Unusual change in spare levels	Fluctuations indicate possible problems developing			
	TECHNICAL				
	Significant downward reliability trend				X
	Engineering efforts routinely required for problems	Technical support necessary for continual use			
	Engineering Change Proposal (ECP) timeline exceeds technology turnover rate	Time to process changes gives obsolete solutions			
	Many changes, deviations or waivers pending				
	High annual rates for changes, deviations or waivers				
	BUSINESS				
	Out-of-production parts	Production restart required			X
	Difficult procurements	Unit cost trends increasing, or source selection problems			X
	Parts no longer available or vendor's product is designed differently	Design obsolescence or vendor base problems			
	Service's standardization requirements changed, i.e. Horizontal Technology Insertion (HTI), and parts standardization	Policy mandates required changes			
	MANAGEMENT				
	User changed the requirements				
	Changes in laws and regulations (ODC's, Hazardous/Prohibited Processes)				

Here is an initial screening checklist for our antique truck wheel spoke.

A broken spoke causes the solid rubber tire to crack and eventually come off the rim. Cracked, broken or loose spokes results in a failed safety inspection and a non operational truck. The TDP specifies air-dried shagbark hickory wood which is difficult to obtain.

Do you agree with the items checked here. (system availability driver, high usage rate, out of production parts, difficult procurement). The wheel spoke is obviously an MTS candidate. Lets go to the next screening step.

Three Step MTS Screening Process

How do we pick candidates that will have the biggest payoff?

Available Information

1-Initial Screen

2-Collect Additional Information

3-Priority Screen

Three steps -- to minimize the amount of research

1- Initial trigger item screen to identify candidates

2- Collect additional information on candidates

3- Second screen to prioritize candidates

Priority candidates for MTS
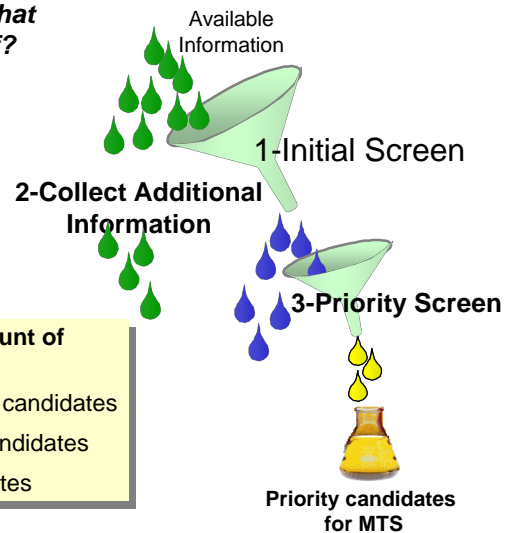
3/7/98   TDP Conversion for MTS   19

Here on this chart, for reference, is our three step screening process again.

After completing the initial screen we should have identified a finite list of potential modernization through spares candidates. The next step is to collect information to support prioritizing action for the candidates.

Research and Prioritizing

Perform Market Research and Identify Risks

Prioritize among candidates

Now What?

- **Define detailed criteria relevant to your situation**

- **Perform research and develop more information on candidates**

- **Start with the most important items**

3/7/98   TDP Conversion for MTS   20

The key to these steps in the screening process is to determine what to search for. Detailed criteria for setting priorities will vary from commodity to commodity and situation to situation. It will be necessary to take a step back and isolate the factors that are most important to you.

The following slides provide a very good start and at least suggest criteria to pick from. Keep in mind that data from the industrial support base will be important.

PRIORITY CRITERIA

LOGISTICS	TECHNICAL
✓ Item with less life than the system ✓ Items need specialized test equipment or personnel training ✓ Items with poor documentation or maintenance procedures ✓ Items with failure patterns or repair histories unique to a site ✓ Changes in maintenance requirements ✓ Items require organizational off-equipment support	✓ Next higher assembly offers benefits ✓ Safety issues require detailed design oversight

Here is a listing of factors leading to criteria for prioritizing effort between MTS candidates. While they are not used in the initial screen to select potential candidates, we consider these lower-priority triggers to help guide the collection of information to prioritize the potential candidates. The lists are not intended to be complete. Your situation may require different criteria.

BUSINESS	MANAGEMENT
✓ Sole source supplier	✓ NATO Standardization requirements
✓ Deminishing manufacturing sources	✓ Changes in skill level requirements
✓ Contractor logistics support opportunities	✓ Changes in operating environment
✓ Market research indicates similar product lines exist	
✓ Market research indicates change in manufacturing process occurred	
✓ Market research indicates materials change occurred	

3/7/98 — TDP Conversion for MTS — 22

Here are additional factors in the business and management areas. In particular the business factors depend on market research and a good grasp on what has happened to the industrial support for the items being evaluated. A build to print TDP is not of much value if there are few suppliers to respond to it.

The next slide is a MTS Priority Screening Checklist which ties the factors together for evaluation. The checklist gives three rankings from low to high in importance to give flexibility in setting priorities for MTS action. The checklist should be tailored to fit your specific situation. The final ranking of candidates is a judgement call.

MTS Priority Screening Checklist

✓	MTS Criteria		Importance		
	Area	*Factors*	**Low**	**Med**	**High**
	Second Screen				
	LOGISTICS				
	Item has less projected life than system lifetime	Replenishment spares required			
	Changes in maintenance requirements	Increasing maintenance hours for repairs			
	Item has poor documentation or maintenance procedures	May affect reliability			
	Item has failure patterns or repair history unique to a location	Training, repair or environment issue			
	Item needs specialized test equipment or training				
	Item requires organizational off-equipment support				
	TECHNICAL				
	Next higher assembly offers benefits	Step-up to next higher assembly for design, cost, operational or maintenance benefits			
	Safety issues require detailed design oversight	Aviation safety, Army fuze board			
	BUSINESS				
	Sole source supplier	Proprietary designs used or smaller industrial base			
	Diminishing Manufacturing Sources (DMS)	Few bidders			
	Long or increasing procurement lead times				
	Contractor Logistics Support (CLS) opportunities increasing	More competition and innovation available			
	Market research indicates change in manufacturing process occurred	Newer solutions may be available			
	Market research indicates materials change occurred	Newer solutions may be available			
	Market research indicates similar product lines exist	Newer solutions may be available			
	MANAGEMENT				
	NATO standardization requirements				
	Changes in personnel skill levels	Changes in personnel policies affect maintenance concepts			
	Deployment changes over-stress system & components increasing repair or parts demand	User changed requirements			
	Changes In Operating Environment	User changed requirements			

Another screening chart to help with the prioritization process.

MTS Priority Screening Checklist
Antique Truck

✓	MTS Criteria		Importance		
	Area	*Factors*	**Low**	**Med**	**High**
	Second Screen				
	LOGISTICS				
	Item has less projected life than system lifetime	Replenishment spares required		X	
	Changes in maintenance requirements	Increasing maintenance hours for repairs			
	Item has poor documentation or maintenance procedures	May affect reliability			
	Item has failure patterns or repair history unique to a location	Training, repair or environment issue	X		
	Item needs specialized test equipment or training				
	Item requires organizational off-equipment support		X		
	TECHNICAL				
	Next higher assembly offers benefits	Step-up to next higher assembly for design, cost, operational or maintenance benefits			
	Safety issues require detailed design oversight	Aviation safety, Army fuze board			
	BUSINESS				
	Sole source supplier	Proprietary designs used or smaller industrial base		X	
	Diminishing Manufacturing Sources (DMS)	Few bidders		X	
	Long or increasing procurement lead times			X	
	Contractor Logistics Support (CLS) opportunities increasing	More competition and innovation available			
	Market research indicates change in manufacturing process occurred	Newer solutions may be available	X		
	Market research indicates materials change occurred	Newer solutions may be available			
	Market research indicates similar product lines exist	Newer solutions may be available	X		
	MANAGEMENT				
	NATO standardization requirements				
	Changes in personnel skill levels	Changes in personnel policies affect maintenance concepts			
	Deployment changes over-stress system & components increasing repair or parts demand	User changed requirements		X	
	Changes In Operating Environment	User changed requirements		X	
	Items Need Unique Training	Specialized skills necessary for this item, subsystem or system			

Lets apply the checklist to our antique truck wheel spoke. For your information market research also found a dealer who specializes in replicating antique wooded automobile wheels with metal reinforcement at normal failure points. They also provide semineumatic tires to go with the wheels designed to allow the antiques to be driven with less over all stress.

[Answer: Item has less projected life than system; failure pattern unique to use (our club drives more than it displays); requires off-equipment support (sending it to specialists in Canada for repair); next higher assembly offers benefits; sole source supplier; long procurement lead times (Canadian company takes about 3 months to make repairs); similar product lines exist (metal reinforced wheels); Lots of triggers here. Obviously our wheel spoke is in need of MTS action.

➤ **MTS is appropriate in most cases, but will give us the best results if we first apply it to areas where there are SIGNIFICANT problems. (We have to do something about these problems anyway)**

➤ **To find these problem areas we can apply performance based business concepts**

➤ **Logistics, Technical, Business and Management criteria can be defined to use as triggers**

➤ **Improving reliability, reducing spares demands -- with corresponding lower maintenance, will have long term benefits**

➤ **Triggers help identify which parts, subsystems and systems can apply Modernization Through Spares**

Completing the MTS Initial Screening and Priority Checklists takes the first step towards implementing modernization through spares by identifying items and their TDPs for priority action. Those checklists provide a systematic use of trigger-item management to isolate TDPs with obvious problems. The checklists should be tailored to apply to specific commodities and situations.

Once priorities are set the next steps in the modernization through spares process can be taken with better focus and allocation of resources.

Discussion/ Exercise Tasks

TDP Conversion for MTS

Acquisition

AR Reform Week III

Vehicle Display Unit Case

DISPLAY UNIT, DRIVERS
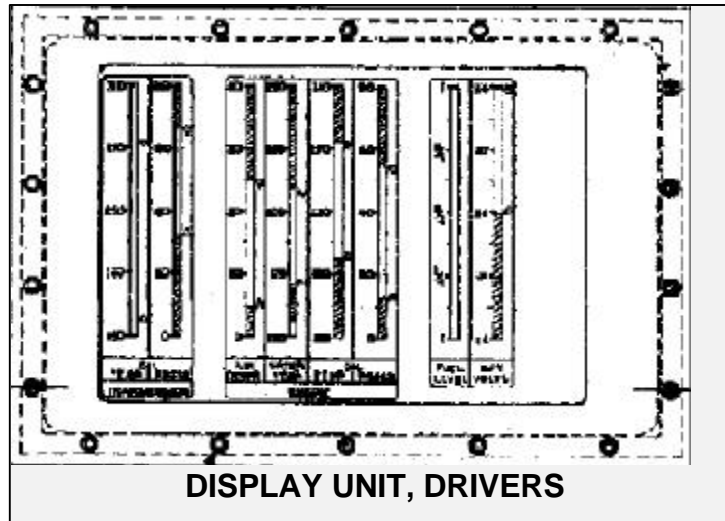
BACKGROUND

- You are a product engineer working in the Integrated Material Management Center (IMMC). Your responsibilities focus on the engineering issues associated with repair, replacement, and/or replenishment of components of fully fielded systems following interim contractor support.

- One of the programs you monitor is the vehicle - assault amphibious - personnel (VAAP). The VAAP was fielded in 1972 and last upgraded in 1991. A very low rate of production has been sustained for the last 12 years by upgrades and low quantity foreign military sales. The Government has configuration control of the VAAP functional, allocated and product baselines. Selected elements of the TDP were updated in 1995 to support manufacture of 35 vehicles for a foreign country via the foreign military sales program.

- Army Special Operations Force (SOF) elements are the primary users. Marine Expeditionary Forces also operate the VAAP, but rely exclusively on the Army logistics system for VAAP support. The Marine Corps has chosen to operate the same VAAP configuration as the Army SOF elements in order to minimize its infrastructure costs. The United States operates 1207 VAAPs and 20 foreign countries operate another 933.

- The Army routinely purchases spares, replenishment, and repair components to the TDP configuration using the assigned National Stock Number (NSN). The "Display Unit, Drivers" has been a headache for years. Recently, users have identified it as a primary readiness degrader.

- The Item Manager (IM) for the VAAP has requested a technical management review of all product lines now under the IM's control that have been identified by the user as readiness issues. The IM indicates that Modernization Through Spares (MTS) opportunities should be sought as the VAAP will be in the inventory until 2012 vice retiring in 2003.

- MTS is getting "big play" around acquisition circles and the IM wants to take a pro-active stance rather than reacting to obsolescence or reliability issues on a case-by-case basis.

- Since you periodically screen the Field Vehicle Performance Data System for product trend indicators in search of possible technology improvement candidates, you know what a headache the Display Unit, Drivers has been. Unit failures have increased exponentially. Repair of these 25 year old items has lagged. Production is a trickle.

- You decide to list everything you know about the Display Unit, Drivers.

  - A subcontractor developed and manufactured the original item for the VAAP prime contractor. Following interim contractor support, the Army broke the item out and provided it to the prime as Government Furnished Equipment. The Army also established an organic repair capability. Fifteen years ago the Army competed the Display Unit and awarded the spares contract to another contractor. The original Display Unit contractor migrated to other product lines and no longer has a business interest in the VAAP display unit. During the years of low demand, the now sole source contractor cut back on Display Unit production capability. At least 12 months are required to reestablish full production capability.

  - Demand for these items has been steadily increasing. The depot can not meet the demand. In fact, the repair cycle has increased from 5 months to 9 months in the last two years and is creeping toward 12 months.

  - Increased tempo in operations (OPTEMPO) in Europe, specifically influenced by activities in Bosnia, has put increased stress on vehicle display units in that theater. Troops may be in Bosnia for another 5 years, maybe longer, plus a high state of alert must be maintained in Korea and Kuwait.

  - Some late 1970's technology was introduced in 1980 by a major upgrade to the armament and armor subsystems. During the 1980s, the navigation and communication subsystems were upgraded several times.

  - The Display Unit performed well until the late 1980's when circuit cards began to fail often enough to impact the VAAP availability requirement of 85%. A combination of organic depot repair, build to print circuit card

procurements, and reduced OPTEMPO mitigated the recurring readiness problems for awhile. But, now Display Unit failures are consistently driving vehicle availability below 85% again.

- Initially, Display Unit failures traced to the microcircuits on the signal conditioner circuit card. Engineers believe that repeated replacement of microcircuits on these cards has induced elements near the microcircuits to begin to fail as well. This situation along with a shortage of parts has caused the reliability of the Display Unit to spiral downward to the point that VAAP availability has been impacted. The other Display Unit circuit cards are contributing to this situation but their failures appear to be uniform across each card rather than being isolated to a specific component.

- Frequency of repair and associated costs had exhibited a noticeable upward trend before Bosnia operations. Now this trend has accelerated. Repaired Display Units have increased in cost from $4700 each last fiscal year to $6200 each this fiscal year to an estimate of $7500 each next fiscal year.

- Build-to-print spares from the Display Unit contractor currently cost $5900 each but are projected to increase to $8300 if the production line is returned to full capability. Production lead-time of 7.5 months could decrease to 4 months when the production line has returned to full capability.

- Quality Deficiency Reports (QDR) and other user correspondence relevant to the Display Unit have increased in quantity and tone. The user is tired of living with this issue and wants it resolved. Readiness of units stationed overseas is a top Army priority so inquiries on what is being done to resolve VAAP availability are coming in daily.

- The IM has made it clear that issues must be resolved within budget. Additional funds are not available and the Army cannot afford the current repair or procurement cost. The resolution to the Display Unit, Drivers issues must be timely, must include a cost reduction, and must resolve the recurring readiness issue.

MARKET RESEARCH

- As part of your market surveillance responsibilities you have been reviewing display technology at trade shows and in trade publications. Also, as a member of the International Council on Systems Engineering (INCOSE) and of the Society of Logistics Engineers (SOLE), you have developed relationships with engineers who have put you in contact with recognized experts in ground, air, and water vehicle display technology. Through all of these sources you know that today industry has available advanced approaches to displaying transmission and engine oil pressure,

transmission and engine oil temperature, engine coolant temperature, fuel level, battery voltage, and air filter restriction in a wide range of vehicle applications. However, materials and manufacturing processes have changed to the point that industry is disinterested in building to a 1970's era TDP. Industry is willing to modify existing designs or develop a new product to meet Government requirements as long as both approaches would be consistent with today's materials and processes. From your trade show observations and professional affiliations you estimate that over 14 companies would be able to respond to a solicitation for a state-of-the-art propulsion system, fuel quantity, and battery status display unit. These companies regularly deliver redesigned units 6 months and newly designed units 10 months after contract award. Market prices of current technology display systems are half the cost of repairing or building to the existing TDP. Long term contracts can reduce the prices even more.

TASKS

- You, the Display Unit Secondary Item Manager, a contracting specialist, and several others meet to develop a strategy to resolve the Display Unit issues. **The VAAP IM wants a strategy recommendation accompanied by the requisite documentation to implement it and supporting rationale.** You brief the team on the latest Display Unit circuit card status. Then the team begins to address the following tasks.

    1)   **Perform the initial MTS screen** (use MTS initial screening checklist)) to determine the applicability of MTS.

    2)   **Analyze the market research** to assess the potential of the marketplace to meet the need.

    3)   **Perform the second MTS screen** (use MTS priority screening checklist) to assist in prioritizing competing MTS candidates with limited resources.

MTS Initial Screening Checklist
Vehicle Display Unit

✓	MTS Criteria		Importance		
	Area	Factors	Low	Med	High
	First Screen				
	LOGISTICS				
	Item is a system availability driver	Increasing MTTR, upward NORS trends			
	High usage rate	Resulting in high annual costs			
	Increasing demand	Increasing parts demand over time			
	High unit cost				
	Unusual change in spare levels	Fluctuations indicate possible problems developing			
	TECHNICAL				
	Significant downward reliability trend				
	Engineering efforts routinely required for problems	Technical support necessary for continual use			
	Engineering Change Proposal (ECP) timeline exceeds technology turnover rate	Time to process changes gives obsolete solutions			
	Many changes, deviations or waivers pending				
	High annual rates for changes, deviations or waivers				
	BUSINESS				
	Out-of-production parts	Production restart required			
	Difficult procurements	Unit cost trends increasing, or source selection problems			
	Parts no longer available or vendor's product is designed differently	Design obsolescence or vendor base problems			
	Service's standardization requirements changed, i.e. Horizontal Technology Insertion (HTI), and parts standardization	Policy mandates required changes			
	MANAGEMENT				
	User changed the requirements				
	Changes in laws and regulations (ODC's, Hazardous/Prohibited Processes)				

MTS Priority Screening Checklist
Vehicle Display Unit

✓	MTS Criteria		Importance		
	Area	*Factors*	**Low**	**Med**	**High**
	Second Screen				
	LOGISTICS				
	Item has less projected life than system lifetime	Replenishment spares required			
	Changes in maintenance requirements	Increasing maintenance hours for repairs			
	Item has poor documentation or maintenance procedures	May affect reliability			
	Item has failure patterns or repair history unique to a location	Training, repair or environment issue			
	Item needs specialized test equipment or training				
	Item requires organizational off-equipment support				
	TECHNICAL				
	Next higher assembly offers benefits	Step-up to next higher assembly for design, cost, operational or maintenance benefits			
	Safety issues require detailed design oversight	Aviation safety, Army fuze board			
	BUSINESS				
	Sole source supplier	Proprietary designs used or smaller industrial base			
	Diminishing Manufacturing Sources (DMS)	Few bidders			
	Long or increasing procurement lead times				
	Contractor Logistics Support (CLS) opportunities increasing	More competition and innovation available			
	Market research indicates change in manufacturing process occurred	Newer solutions may be available			
	Market research indicates materials change occurred	Newer solutions may be available			
	Market research indicates similar product lines exist	Newer solutions may be available			
	MANAGEMENT				
	NATO standardization requirements				
	Changes in personnel skill levels	Changes in personnel policies affect maintenance concepts			
	Deployment changes over-stress system & components increasing repair or parts demand	User changed requirements			
	Changes In Operating Environment	User changed requirements			

reform

Week III

Solutions

TDP Conversion for MTS

acquisition

MTS Initial Screening Checklist
Vehicle Display Unit Solution

LOGISTICS				
Item is a system availability driver	Increasing MTTR, upward NORS trends			x
High usage rate	Resulting in high annual costs			x
Increasing demand	Increasing parts demand over time		x	
High unit cost			x	
Unusual change in spare levels	Fluctuations indicate possible problems developing			
TECHNICAL				
Significant downward reliability trend				x
Engineering efforts routinely required for problems	Technical support necessary for continual use			
Engineering Change Proposal (ECP) timeline exceeds technology turnover rate	Time to process changes gives obsolete solutions			
Many changes, deviations or waivers pending				
High annual rates for changes, deviations or waivers				
BUSINESS				
Out-of-production parts	Production restart required			x
Difficult procurements	Unit cost trends increasing, or source selection problems			x
Parts no longer available or vendor's product is designed differently	Design obsolescence or vendor base problems			x
Service's standardization requirements changed, i.e. Horizontal Technology Insertion (HTI), and parts standardization	Policy mandates required changes			
MANAGEMENT				
User changed the requirements				
Changes in laws and regulations (ODC's, Hazardous/Prohibited Processes)				

MTS Priority Screening Checklist
Vehicle Display Unit Solution

✓	MTS Criteria		Importance		
	Area	Factors	Low	Med	High
	Second Screen				
	LOGISTICS				
	Item has less projected life than system lifetime	Replenishment spares required		x	
	Changes in maintenance requirements	Increasing maintenance hours for repairs			
	Item has poor documentation or maintenance procedures	May affect reliability			
	Item has failure patterns or repair history unique to a location	Training, repair or environment issue			
	Item needs specialized test equipment or training				
	Item requires organizational off-equipment support				
	TECHNICAL				
	Next higher assembly offers benefits	Step-up to next higher assembly for design, cost, operational or maintenance benefits		x	
	Safety issues require detailed design oversight	Aviation safety, Army fuze board			
	BUSINESS				
	Sole source supplier	Proprietary designs used or smaller industrial base		x	
	Diminishing Manufacturing Sources (DMS)	Few bidders			
	Long or increasing procurement lead times			x	
	Contractor Logistics Support (CLS) opportunities increasing	More competition and innovation available			
	Market research indicates change in manufacturing process occurred	Newer solutions may be available		x	
	Market research indicates materials change occurred	Newer solutions may be available		x	
	Market research indicates similar product lines exist	Newer solutions may be available		x	
	MANAGEMENT				
	NATO standardization requirements				
	Changes in personnel skill levels	Changes in personnel policies affect maintenance concepts			
	Deployment changes over-stress system & components increasing repair or parts demand	User changed requirements		x	
	Changes In Operating Environment	User changed requirements			
	Items Need Unique Training	Specialized skills necessary for this item, subsystem or system			